

Question 4: Flows analysis

Austin Byrne^a

^aThe best quantitative analyst ever seen, Stellenbosh

Abstract

In this question I evaluate whether past performance of a fund is a good indicator of future performance and whether this pushes active investors to invest in the high performing funds solely on past performance. In this question I evaluate two look back periods, one on the shorter spectrum being 3 years and another on the longer being 10 years. I draw up scatter plots and run correlation and regression analysis to perform my analysis.

1. Introduction

This question will provide insight into industry fund flows between actively managed funds. More specifically, I will firstly be evaluating whether funds that have performed well in the past provides an indicator to investors that they will perform well in the future. I will then be evaluating whether this is a good investment strategy, to continually invest in funds that have performed well in the past. A crucial component of this analysis is the look back period, ie) how long must a fund perform well before it is inducted as an above average performing fund. In this question I will be evaluating a look back period of 3 years and 10 years.

1.1. Loading the data and relevant packages

The relevant data that is loaded here contains information on the various actively traded funds, along with trading flow data and returns.

1.2. Data preparation

To prepare this data for analysis I join the two flows and returns data sets, insure that the date is of the correct format and filter out any “Fund of Funds” data.

1.3. Defining the look-back period and future performance periods

For the first comparison I will be evaluating a look back period of three years. This look back period is the shortest of the look back periods that will be evaluated. The main takeaway from this analysis is as follows; if a fund performs well for a fairly short period of three years, does this indicate that the future is bright for the fund and will this attract new investment?

1.4. Calculating cumulative returns for the 3 year look back period

The cumulative returns of the 3 year period is calculated so that a comparative analysis can be done.

1.5. Analyzing fund flows and future performance

Calculating the future performance (the performance a year after the look back period) will provide somewhat of an answer to whether the look back period was a good indicating of the following period.

1.6. Analyzing data

To analyze the data, a scatter plot, correlation analysis and regression analysis will be conducted.

1.6.1. Scatter plot illustrating the relationship between past performance and future performance

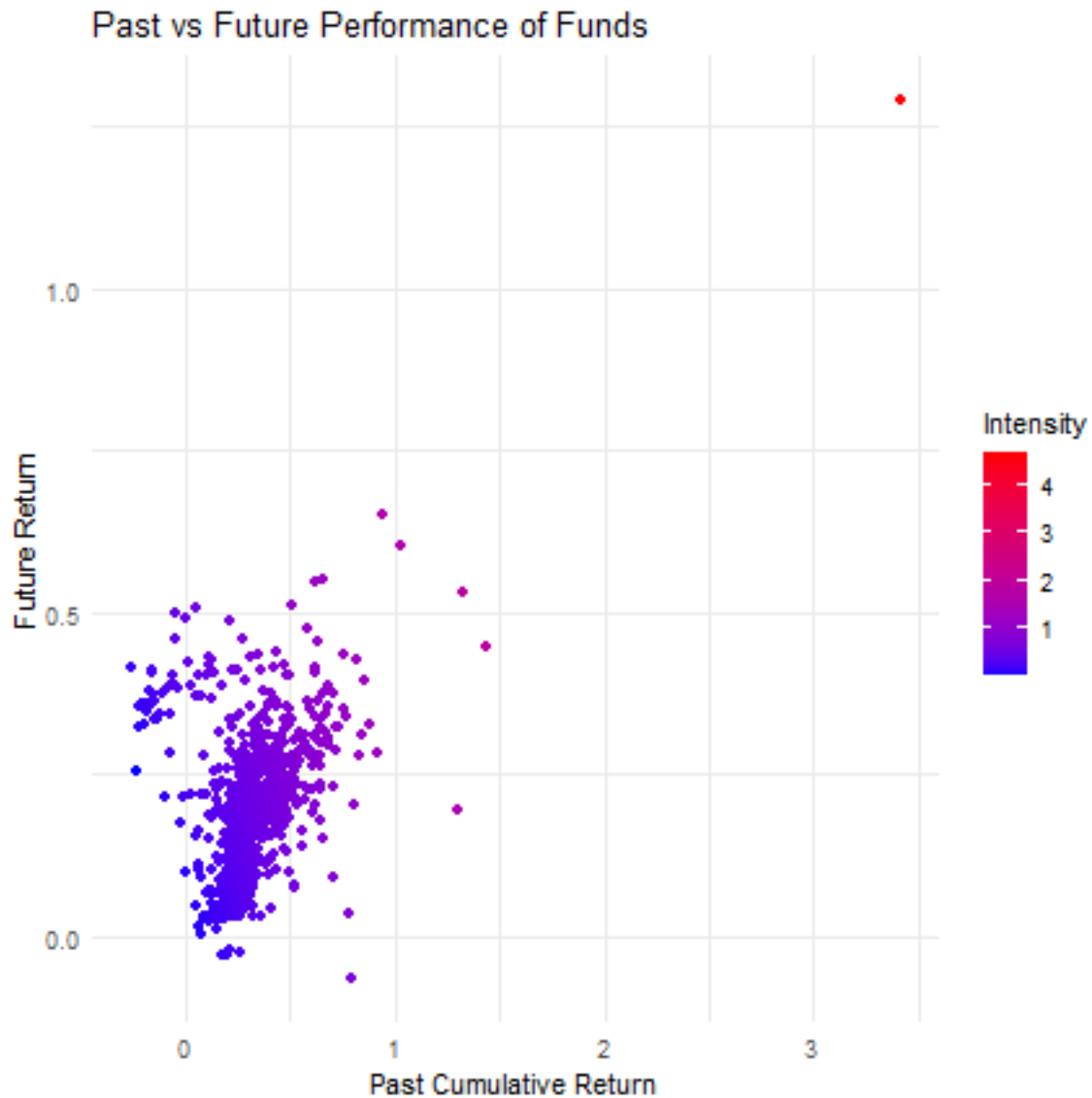


Figure 1.1: 3 year look back scatter plot

As can be seen from the above graph, there does seem to be a positive correlation between past cumulative returns and future performance. However, not so straight forward, as there are some funds that had a poor past cumulative return but had good future returns. Lets do some further analysis.

1.6.2. correlation analysis between cumulative past returns (3 years) and total flow

```
##
## Pearson's product-moment correlation
##
## data: combined_analysis$cumulative_return and combined_analysis$total_flow
## t = 2.038, df = 849, p-value = 0.04186
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## 0.002581492 0.136338075
## sample estimates:
## cor
## 0.06977338
```

Table 1.1: Correlation Analysis Results

Statistic	Value
Correlation Coefficient	0.0697734
P-Value	0.0418600
95% Confidence Interval Lower Bound	0.0025815
95% Confidence Interval Upper Bound	0.1363381

The above correlation analysis provides some interesting results. The output suggests that there is a weak positive relationship between funds past 3 years performance and fund flows. Thus, although three years past performance may induce some flows towards that fund this pull is not relatively strong. Since the p-value is below 0.05 this weak positive relationship is not random. Therefore, although there is some truth in saying a 3 year strong performing fund will induce more investment. there are most probably a lot more factors that goes into the selection process of investors when deciding where to allocate there funds.

1.7. Lets create a linear regression to see if 3 years past performance does indicate future performance.

```
##
## Call:
## lm(formula = future_return ~ cumulative_return, data = combined_analysis)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -0.35143 -0.08688 -0.01069 0.05119 0.49152
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.130772  0.006873   19.03  <2e-16 ***
## cumulative_return 0.195478  0.017903   10.92  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1103 on 849 degrees of freedom
## (119 observations deleted due to missingness)
## Multiple R-squared:  0.1231, Adjusted R-squared:  0.1221
## F-statistic: 119.2 on 1 and 849 DF, p-value: < 2.2e-16
```

Table 1.2: Linear Regression Model Summary

term	estimate	std.error	statistic	p.value
(Intercept)	0.1308	0.0069	19.0265	0
cumulative_return	0.1955	0.0179	10.9190	0

This regression analysis shows that there is a statistically significant relationship between past return values and future return values. Thus funds with higher past returns tend to have higher future returns. However the R-squared value is fairly low at 0.12 which suggests that past performance only explain 12% of the variation in future performance. Thus although past performance does have a statistically significant positive relationship with future performance, this relationship is fairly weak and should not be solely relied upon.

1.8. Lets evaluate the 10 year look back period

1.8.1. Calculating cumulative returns for the 10 year look back period

The cumulative returns of the 10 year period is calculated so that a comparative analysis can be done.

1.8.2. Analyzing fund flows and future performance

Calculating the future performance (the performance a year after the look back period) will provide somewhat of an answer to whether the look back period was a good indicator of the following period.

1.8.3. Analyzing data

To analyze the data, a scatter plot, correlation analysis and regression analysis will be conducted.

1.8.4. Scatter plot illustrating the relationship between past performance and future performance

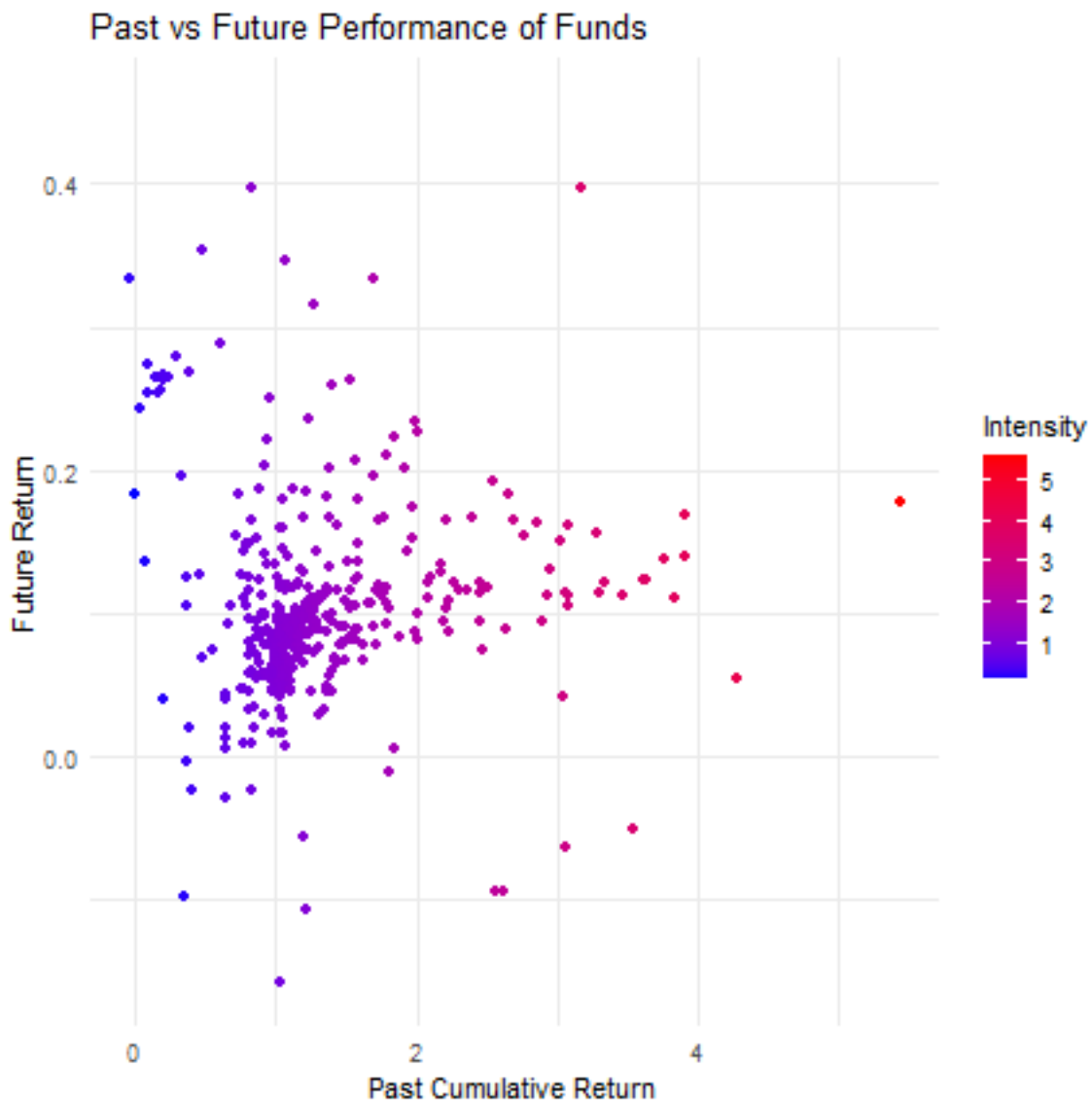


Figure 1.2: 10 year look back scatter plot

As can be seen from the above figure, there is a far greater variability when the look back period is increased to 10 years. More importantly there still seems to be a positive relationship between past cumulative returns and future returns. However, to identify whether this relationship is stronger or

weaker at longer look back periods we will have to complete a correlation and regression analysis.

1.8.5. correlation analysis between cumulative past returns (10 years) and total flow

```
##
## Pearson's product-moment correlation
##
## data: combined_analysis$cumulative_return_10 and combined_analysis$total_flow
## t = 1.7016, df = 400, p-value = 0.08961
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.01314346 0.18107861
## sample estimates:
## cor
## 0.08477276
```

Table 1.3: Correlation Analysis Results

Statistic	Value
Correlation Coefficient	0.0847728
P-Value	0.0896100
95% Confidence Interval Lower Bound	-0.0131435
95% Confidence Interval Upper Bound	0.1810786

Like that of the 3 year look back period the correlation between past performance and funds flow is still weakly positive at 0.08. This is stronger than that of the three year look back period at 0.07 however it is not as strong as I would have thought. Furthermore, the p-value has increased from 0.04 (for the 3 year look back period) to 0.08 which suggests that the results are not statistically significant at the 5% level. However, these results are still statistically significant at the 10% level. The main takeaway from this correlation analysis is that by increasing the look back period we have not increased the correlation between past fund performance and funds flow.

Lets now have a look at the regression analysis for the 10 year look back period.

1.8.6. Lets create a linear regression to see if 10 years past performance does indicate future performance.

```
##
```

```
## Call:
## lm(formula = future_return_10 ~ cumulative_return_10, data = combined_analysis)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.25997 -0.03776 -0.01160  0.01976  0.29579
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.098435   0.007164  13.741  <2e-16 ***
## cumulative_return_10 0.003000   0.004735   0.634   0.527
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.06966 on 400 degrees of freedom
## (101 observations deleted due to missingness)
## Multiple R-squared:  0.001002,    Adjusted R-squared:  -0.001495
## F-statistic: 0.4014 on 1 and 400 DF,  p-value: 0.5267
```

Table 1.4: Linear Regression Model Summary

term	estimate	std.error	statistic	p.value
(Intercept)	0.0984	0.0072	13.7406	0.0000
cumulative_return_10	0.0030	0.0047	0.6335	0.5267

From the above regression analysis the results provide some interesting analysis. Like that of the correlation analysis, the regression analysis states that there is a weak insignificant relationship between past cumulative returns and future returns. Thus, even if a fund performs well for 10 years, this is not a solid indicator that the fund will perform well in the following period. Furthermore, the regression analysis provides an extremely low r-squared value that suggests that past performance does not hold a significant explanation in the future returns of funds.

1.8.7. Summary

For both the three year and ten year look back periods, past performance is not a good indicator at both fund flows and future performance. This suggests that when investors are looking to invest their money they look at other factors rather than just past performance, which according to our analysis is the right approach, as past performance is not a good indicator at future performance.

References

Appendix

Appendix A

Some appendix information here

Appendix B